Installer - Need to Know

Level 1 = apprentice, beginner
Level 2 = journey man, advanced

I. The professional will understand the general overall site planning and preparation. Be able to ask questions. Have copies of issued permit documentation. Conventional systems have more flexibility and are generally level 1 competencies unless there are site limitations to be considered. Commercial conventional and alternative or advanced treatment will require more advanced (level 2) knowledge and consultation with designer. *Unless otherwise noted this section is all required for level 1 installers.*

A. Reading and understanding plans/profiles
   1. Drawings
      a. Types
         (1) Vicinity map/site location
         (2) Site plan
         (3) Profiles
         (4) Hydraulic profiles
         (5) Cross-section views
         (6) Plan and profile/cross-section detail (Enlargement) views
      b. Benchmarks
      c. Orientation
      d. Elevations
      e. Boundaries & setbacks
      f. Scale
      g. Contours
   2. Notes
      a. General construction notes
      b. Material specifications
      c. Designer's notes
         (1) General construction notes
         (2) Specific equipment installation notes
      d. Regulatory requirements
      e. Factory specs/Shop drawings (how the component was built)
   3. Equipment specifications
   4. List of materials/equipment/parts
   5. Design calculations
      a. Pump curves
      b. Buoyancy
      c. Component sizing
   6. Manufacturer installation requirements (how the component needs to be installed)

B. Surveying
   1. Equipment
   2. Surveying techniques
   3. Bench points

C. General walk-about site to compare the plans against the actual site
   1. Topography
   2. Setbacks
   3. Slopes
   4. Drainage
   5. Soil types
   6. Etc.

D. Addressing design changes as a result of site walk-about
   1. Identify any changes to original plans, including changing to "equivalent" specifications
   2. Understand difference between design change and field change
   3. Provide these identified changes to designer for review and approval (may include regulatory approval)

E. Laying out the System
   1. Staking
   2. Blue Stake/private locater
   3. Setbacks
   4. Drainfield/soil treatment area on the contours
   5. Tank accessibility
   6. Equipment accessibility/Ingress-Egress
   7. Maintainability
   8. Problem identification (see also I.D.)

F. System installation methods
   1. Ground pressure/compaction
   2. Backhoe bucket width
   3. Travel pathways over the site
   4. Work from upslope

II. The professional will understand the general best management practices for installation. ***Unless otherwise noted this section is all required for level 1 installers.***

Commented [k1]: Kitt will look at NAWT Installer's Manual

A. Personal Protective Equipment
B. Site Safety Practices
C. Site Conditions
   1. Proper weather & soil moisture conditions for installation
      a. Frozen soils-wait till thaw
      b. Wet soil
      c. Rain
      d. Surface water diversion and erosion control

D. Hazards
   1. Tipping of equipment
   2. Damage from rotation
   3. Cave-in/collapse/shoring protection
   4. Utilities – overhead & underground
   5. Confined space entry requirements

E. Verification of functionality of all existing and/or reused components

III. Professional must understand regulations associated with installing. ***Unless otherwise noted this section is all required for level 1 installers.***

A. Local, county, state, federal
   1. Currently adopted plumbing code (note: varies by jurisdiction)
   2. Currently adopted electrical code (note: varies by jurisdiction)

B. Needs for as-built drawings

C. Proof of specifications
   1. Watertightness
   2. Sand size
   3. Substitution equivalency

D. OSHA safety requirements & compliance

IV. Professional will understand installation issues with system components. ***Unless otherwise noted this section is all required for level 1 installers.***

A. Building sewer specifications (NOTE: level 2 but level 1 should know where to find applicable plumbing code)
   1. Pipe specifications
   2. Depth
   3. Slope (with and without solids)
   4. Freezing
   5. Cleanouts
   6. Sub-base density (no settling/bellies)
   7. Cleaning, priming, and gluing joints

B. Septic Tank
   1. General tank protections-don't drive over, installation requirements, leak testing procedure
   2. Location (setbacks)
   3. Setting and securing a tank in high-water table areas
   4. Dimension/capacity check
   5. Baffling
      a. Types
      b. Materials
      c. Fasteners
      d. Dimensions
   6. Sealing between joints, inlet and outlet pipes, penetrations, riser joints
   7. Constructing pour-in-place tanks (NOTE: level 2)
      a. Design (dimensions, strength, etc.)
      b. Concrete type
      c. Re-bar requirements
      d. Climatic conditions
   8. Testing watertightness
   9. "Securing" manhole covers
   10. Manhole warning label
   11. Bedding
   12. Backfilling
      a. Pipes entering and exiting tank (ensure proper compaction to prevent shearing)

b. Tank
c. Crowning over tank

13. Access openings
    a. Elevation
        (1) At grade
        (2) 6” below grade with surface marker
    b. Security
14. Insulating tanks

C. Distribution System
1. Supply pipes
2. Materials
3. Size
4. Slope
5. Sub-base requirements
6. Bedding, leveling, backfilling, compaction
7. Freezing (w/distribution pipes)
8. Cleaning, priming, and gluing joints

D. Gravity Distribution
1. Manifolds
    a. Why manifolds are a bad decision and NOT a Best Practice
    b. Problems with adjusting level once installed
2. Distribution Boxes
    a. Placement
    b. Level slope in and out of box
    c. Pipes entering and exiting d-box needs to be supported
    d. Prevention of settling
    e. Cleaning, priming, and gluing joints
    f. Sealing lid
    g. Insuring even distribution of flow
    h. Maintenance/accessibility
        (1) At grade
        (2) 6” below grade with surface marker
3. Drop Boxes
    a. Elevation
    b. Box specs
    c. Proper slope of pipes in and out of box
    d. Hole configuration
    e. Sub-base requirements
    f. Pipes entering and exiting d-box needs to be supported
    g. Soil cover requirements
    h. Testing flow

E. Pressure Distribution (NOTE: Level 2)
1. Manifold requirements (changing pipe sizing)
2. Pump
    a. Types
    b. Wiring/electrical/conduit

Commented [k2]: Need understanding of pressure distribution so consequences of any field changes are known

c. Pipe installation
d. Check valves/drainback
e. Testing

3. Floats
   a. Types
   b. Setting
   c. Testing
4. Distribution pipe
   a. Types
   b. Hole drilling and bur removal
   c. Cleaning, priming, and gluing joints
   d. Leveling
   e. Bedding of piping
      (1) Methods
      (2) Materials
   f. Manifold construction
   g. Pressure relief valves
   h. Distribution valves
      (1) Diaphragm
      (2) Ratcheting
   i. Testing distal pressure
5. Headworks
   a. Flush valve
   b. Pressure gauge
   c. Screens & filters
   d. Pressure regulator
   e. Pressure relief valves
   f. Automatic valves (solenoid-operated)

F. Control panel
   a. Types
      (1) Analog
      (2) Digital
   b. Wiring
   c. Setting
   d. Testing
   e. Communications/telemetry
   f. Factory documents
   g. Appurtenances
      (1) Event counters
         (a) Types
         (b) Wiring
         (c) Setting
         (d) Testing
      (2) Timers
         (a) Types
         (b) Wiring

(c) Setting
(d) Testing
(3) Alarms
(a) Types (audio and/or visual)
(b) Wiring
(c) Setting
(d) Testing
(i) Communications/telemetry (radio or phone (cell or hard line))

G. Other Pretreatment Technologies
1. Media filters
a. Textile filters
b. Peat filters
c. Sand filters
d. Other
2. Aerobic treatment units
3. Constructed wetlands
4. ET beds (not really treatment)

H. Soil Treatment System
1. Excavation
a. Keep the installation dry
(1) Plastic limit (how to do it, where to take it)
(2) Exposure to rainfall
(3) Weather-related issues
b. Keep the installation natural
(1) Avoid equipment in excavation (traffic, weight, bucket)
(2) Avoid smearing
(3) Avoid driving or walking on surface bottom (beds)
(4) Consider proximity to natural vegetation (future root issues)
c. Keep the installation level
d. Keep the installation shallow
2. Media for filling trenches and beds (and **OMG** seepage pits)
a. Different types/different products for distribution within trench/bed (installation advantages, disadvantages)
(1) Rock
(a) Placement of rock (compaction while placing)
(b) Geotextile
(i) Specs
(c) Placement
(d) Material check for correct product specification, size, durability, and cleanliness of rock.
(2) Cinder
(3) Other (i.e., ground glass, recycled concrete, etc.)
(4) Graveless technologies
(a) Chamber
(b) Other
3. Backfill, see Section L

Commented [FKL-(3]: needs expansion here to address differences between MN and AZ terminology/technology

I. In-ground Systems (location of infiltrative surface)
   1. Types
      a. Trenches, beds, seepages pits
      b. Engineered pads
      c. Drip distribution
   2. Surface preparation
      a. Soil moisture
      b. Equipment
   3. Media placement
   4. Inspection pipes
   5. Installation issues for in-ground systems
   6. Backfill, see Section L
   7. Testing pressure at distal points

J. At-Grade Systems - Level 2 (location of infiltrative system)
   1. Types
   2. Surface preparation
      a. Soil moisture
      b. Equipment
   3. Media placement
   4. Inspection pipes
   5. Backfill, see Section L
   6. Testing procedures for any system that uses a liner
   7. Installation issues for at-grade systems

(Stopped 12-12-17)

K. Mound Systems - Level 2
   1. Surface preparation
      a. Soil moisture
      b. Equipment
   2. Sand
      a. Spec
      b. Testing
      c. Placement
         (1) Minimum depth
         (2) Equipment
   3. Distribution media placement
   4. Pressure distribution within mound – see Section E
      a. Draindown (particularly for freezing conditions)
   5. Inspection pipes

L. Backfill
   1. Protocols
   2. Different types of soils require different protocols
   3. Manufacturer's recommendations
   4. Quantities required
   5. Responsible methods for dealing with excess soil from installations

M. Topsoil - Level 2
   1. Quality
   2. Quantities required
   3. Compaction
      a. Placement with minimal compaction
      b. Account for settling

N. Landscaping
   1. Communication between owner, landscaper, and installer for protection of system
   2. Who is responsible
   3. Vegetation establishment requirement
      a. Seeding/sod recommendation
      b. Proper vegetation selection
         (1) Consider rooting depths and widths
         (2) Consider irrigation needs
         (3) Consider maintenance needs
   4. Frost and erosion protection the first year

V. Professional will understand the installation inspection requirements. ***Unless otherwise noted this section is all required for level 1 installers.***

A. Check local ordinances/standard operating procedures for notification requirements for inspections

B. Types
   1. Designer inspections
   2. Local jurisdiction inspections

C. Preparation of as-built drawings
   1. As-built requirements

D. Who is responsible for various inspections
   1. Final (demonstrating that all the pieces work)
      a. Contractor
      b. Designer
      c. Local jurisdiction

VI. Professional will understand proper tank and soil treatment system abandonment. ***Unless otherwise noted this section is all required for level 1 installers.***

A. Procedure and requirements
   1. Tank
   2. Soil treatment system

VII. Professional will understand general information which is useful to homeowners. ***Unless otherwise noted this section is all required for level 1 installers.***

A. Appropriate vegetation, See Section IV.N
B. Do not drive or build on it
C. Winter time precautions
D. As-built drawings given to them
E. Water use
F. Suitable and unsuitable discharges to system

G. Overall system maintenance - Level 1 conventional, Level 2 Alternative or advanced
   1. Septic tank
   2. Other tanks
   3. Soil treatment system
   4. Pumping system – Level 2
   5. Alarm system - Level 2
H. Do not damage/use reserve area
I. Do not locate irrigation over septic system
J. Owner's manual with care and maintenance procedures

VIII. Professional must have general math skills. ***Unless otherwise noted this section is all required for level 1 installers.***

A. Add, subtract, multiply, and divide
   1. Unit conversion
B. Basic math/algebra/geometry
   1. Slope
   2. Area
   3. Volume
   4. Flow rates, daily design flow
C. Advanced math/algebra/geometry
   1. Flow rates, pumping – Level 2
   2. Total dynamic head – Level 2
      a. Static head
         (1) Elevation changes
      b. Pressure head
         (1) Friction losses
         (2) Pipe diameter
         (3) Flow rate
D. Graphing (pump curves) – Level 2